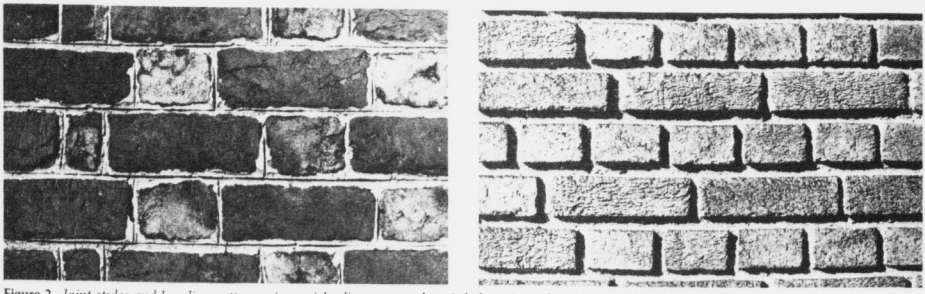

Figure 2. *Joint styles and bonding patterns give a rich, divergent, and varied character to historic masonry walls as is apparent in these two examples. The sample on the left is an 18th century (c. 1720) Flemish bond struck with a grapevine joint; the example on the right, an early 20th century English bond with a raked joint. Successfully recreating the historically correct joint size and profile is of paramount importance in the appropriate repointing of historic brick walls. Photos: Calder Loth.*

Lime or Portland Cement: The two commonly used binders for mortar are lime and portland cement. Of the two, lime produces a mortar that meets nearly all the requirements for a good mortar for historic buildings, while portland cement produces a mortar that does not perform as well. High lime mortar is soft, porous, and changes little in volume during temperature fluctuations. In addition, lime mortar is slightly water soluble and thus is able to re-seal any hairline cracks that may develop during the life of the mortar. Portland cement, on the other hand, can be extremely hard, is resistant to movement of water, shrinks upon setting, and undergoes relatively large thermal movements. The use of a high lime mortar, therefore, is recommended for nearly all repointing projects. *However, the addition of 5 percent white portland cement for not more than 20 percent of the lime will usually improve workability or plasticity without adversely affecting the desirable qualities of the lime mortar.* Workability or plasticity of the mortar is important to ensure that the new mortar forms a good bond with the original mortar and the bricks.

Water: Water should be clean and relatively free of salts or acids.

Historic Additives: In addition to the color of the sand, the texture of the mortar is of critical importance in duplicating historic mortar. While modern mortars are finely ground and present a uniform texture and color, historic mortars were not as well ground. They may contain lumps of oyster shell, partially burned lime, animal hair, or particles of clay. The visual characteristics of these additives should be duplicated through the use of similar materials in the repointing mortar.

Matching Color and Texture of Mortar

In matching the repointing mortar, the new mortar should match the unweathered interior portions of the historic mortar. The simplest way to check the match is to make a small sample of the proposed mix and allow it to cure; this sample is then broken open and the broken surface is compared with the broken surface of the largest "saved" sample of historic mortar.

If it is not possible to obtain a proper color match through the use of natural materials because locally available sands are not a close match to the original sand, it may be necessary to use a modern mortar pigment, and, in fact, some historic mortars did use such additives. In the late 19th century, some mortars were colored with pigments to match or contrast with the brick. Red, brown, and black pigments were commonly used. Pigments are available as separate ingredients or already mixed with mortar; however, the premixed mortars normally are not suited for use on repointing projects because of their high portland cement content. Only chemically pure mineral oxides, which are alkali-proof and sun-fast, should be used in order to prevent bleaching and fading.

Material Specifications

Modern materials specified for use in repointing mortar should conform to specifications of the American Society for Testing Materials (ASTM) or comparable federal specifications.

Sand should conform to ASTM C-144 to assure proper gradation and freedom from impurities. Sand color, size, and texture should match the original as closely as possible to provide the proper color match without other additives. Samples of sand proposed for use should be submitted for approval prior to beginning work.

Lime should conform to ASTM C-207, Type S, Hydrated Lime for Masonry Purposes. This lime is designed to assure high plasticity and water retention with a safe degree of strength. The use of quicklime, which must be slaked and soaked, does not necessarily provide better results.

Cement should conform to ASTM C-150, Type II (white non-staining) portland cement. It should not have more than 0.60 percent alkali to help avoid efflorescence.

Water should be potable—clean and free from acids, alkalies, or large amounts of organic materials.

Historic Additives will require writing new specifications for each project. If possible, suggested sources for special materials should be included. For example, crushed oyster shells frequently can be obtained in a variety of sizes from poultry supply dealers.

Mortar Mix: Specifying the proportions for the repointing mortar for a specific job is often a perplexing task for the architect, engineer, contractor, or preservation